

4.4 Permutations with some Identical Objects

Wednesday, April 03, 2013
9:21 AM

ex Given the word "COUNTERS", how many different 8-letter groups of letters can be written down? (doesn't need to be a word)

Ans 8 letters, choosing all 8

$${}_8P_8 = \frac{8!}{(8-8)!} = \frac{8!}{0!} = 8! = 40320$$

another way

$$\underline{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1} = 8! \\ = 40320$$

ex Given the word "ARRANGER", how many different 8-letter groups?

Ans $\frac{8!}{2! \cdot 3!}$ ← divide away the duplicates
A R
 $= 3360$

Why divide the duplicates?

Is ARRANGER different than ARRANGER?

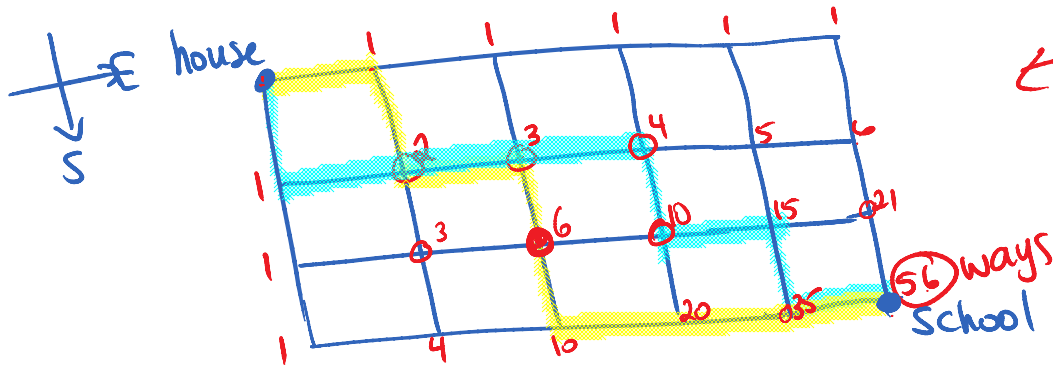
(I traded the A's but you can't tell)

No difference so we must remove those same groups/orders by dividing

$$P = \frac{n!}{a! \cdot b! \cdot c! \dots}$$

$a \rightarrow \# \text{ of that element}$
 $b \rightarrow \# \text{ of another element}$

ex pg 264 Ex 3



Quicker way: (for complete grids) 8 blocks \Rightarrow 5 E and 3 S

$$\frac{8!}{5!3!} = \frac{8 \cdot 7 \cdot 6 \cdot \cancel{5!}}{\cancel{5!} \cdot 3!} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = 8 \cdot 7 = 56$$

use for # 9

Practice pg 266

1-3, 5-7, 9, 11, 12, 16, 17